Using Literacy Strategies for High-Stakes Assessment Preparation

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The article discusses discoveries made by a group of middle school teachers when researching and implementing literacy pedagogical strategies in the mathematics classroom. Specifically, the teachers found that the KWC strategy and the "Think Aloud" strategy were effective in preparing students for high-stakes exams. The article provides samples of online discussion posts the teachers made in which they share their successes in their classrooms using these techniques.

Introduction

When preparing mathematics students for high-stakes tests, mathematics teachers search many resources and techniques to best prepare their students. Mathematics teachers can gain a great deal from the techniques that literacy teachers have developed for teaching concepts and organizing thoughts. Five teachers, while engaged in an online Book Club associated with a teacher workshop, discovered that these techniques can be very helpful for high-stakes assessment preparation.

As part of a professional development workshop for middle-level math teachers, five teachers read and discussed two books pertaining to integrating literacy strategies in the math classroom. The teachers who participated in this project had met during the fall portion of the workshop. Throughout the spring semester, the teachers read the books, discussed strategies online, integrated two of the strategies, and then reflected on the results. As the workshop directors monitored the discussions and evaluated the teachers' final reflections on the project, they noticed that the teachers consistently discussed the effectiveness of the strategies in preparing students for high-stakes math assessments. This paper discusses those strategies and their application to test preparation.

Test Preparation Strategies

Since the implementation of No Child Left Behind legislation in 2002, schools and teachers have been struggling with the challenge of balancing teaching with test preparation. Many teachers look for strategies that can assist their students in tackling standardized tests with precision and thoughtful processing. In *This is Only a Test: Teaching for Mathematical Understanding in the Age of Standardized Testing,* Litton and Wickett (2009) discuss strategies that can be implemented throughout the school year for "creating a classroom culture that supports good thinking and good testing" (p. 91). Others discuss the disadvantages that "teaching to the test", i.e., abandoning teaching new content in lieu of reviewing previous content and test-taking strategies, that high-stakes standardized tests generate (Volante, 2004). Turner (2009) identifies five effective high-stakes test preparation methods: (a) teaching to the curriculum and integrating test content, (b) integrating assessment approaches and item format, (c) reviewing test-taking strategies, (d) judicious timing of test preparation, and (e) engaging student motivation. Good math teachers are always mindful of strategies that help students tackle standardized test questions using an organized process.

Mathematics teachers can gain a great deal from the techniques that literacy teachers have developed for teaching concepts and organizing thoughts.

Integrating Literacy Techniques in the Math Classroom

The books chosen by the teachers were *Literacy Strategies for Improving Mathematics Instruction* by Joan M. Kenney et. al. (2005) and *Comprehending Math Adapting Reading Strategies to Teach Mathematics, K-6* by Arthur Hyde (2006), found at the NCTM store. They felt that these books could be useful in providing strategies that would improve their ability to teach more conceptually.

In *Literacy Strategies for Improving Mathematics Instruction*, the authors present reading, writing, graphic representation, and discourse strategies along with discussion strategies. Specific methods include paraphrasing, graphic organizers, concept mapping, and thinking aloud. In *Comprehending Math,* Hyde discusses more comprehensive topics, such as making connections, visualizing, inferring and predicting, determining importance, and synthesizing.

The discussion portion of the project took place in an online discussion board within the course management tool that the participants and project directors used for the first portion of the workshop.

Characteristics of the Book Club

We refer to the five teachers as, Beth, Claire, Dana, and Eve. Each showed a proficiency in using online communication tools, and each is an early-career teacher. The discussion portion of the project took place in an online discussion board within the course management tool that the participants and project directors used for the first portion of the workshop. This tool enabled the project directors to create a private discussion area, ensuring that the participants and the project directors could post and view their thoughts only within the group. The participants proposed common tasks: (1) to read the books, (2) discuss the various strategies online, (3) implement two of the strategies in their classrooms, and (4) reflect on the effectiveness in a final paper. The project directors approved this proposal. The two strategies chosen were the KWC and "Think Alouds."

The KWC Strategy

The KWC (Know, Want to Know, Constraints) (Hyde, p. 22) is a teaching strategy similar to the KWL strategy (what do you know? what do you want to know? and what did you learn?). In the KWC strategy, the teacher coaches the students through solving a problem by creating three-columns and then has the student chart, "What do you know for sure? (K), What are you trying for find out? (W), and, "Are there any special constraints/ conditions, rules or tricks, I have to watch out for? (C)" (See Figure 1).

What do you know for sure?	What are you trying to find out?	Are there any special conditions?
I know that:	I'm trying to:	I need to:

Fig 1 KWC Chart (Hyde, 2005)

Claire initially proposed that this would be a good strategy for students to help organize their thoughts in order to solve a story problem. For instance, consider a typical problem, "Jesse saves $3.00 a week for a new game. Mary already had $10 in her bank and started saving $2 week for the same game. When would they have the same amount?" Students list those items that they know for sure in the first column (Mary has $10. Jesse starts with $0, etc.). In the second column, students note that they are trying to find the week when both have the same amount. In the last column, students note anything that they feel they need to remember, such as "use a table? Use a chart? Jesse started earlier," etc.

The "Think Aloud" Strategy

The "Think Aloud" (Hyde, p. 42-43) strategy is one in which the teacher completes a problem while talking aloud throughout the process. The students are witnesses to the authentic (or nearly authentic) thinking process that a problem solver progresses through when moving from start to finish. For example, the teacher can use the process when teaching how to find the solution of a one-variable, multiple-step linear equation. The teacher models the problem-solving process in front of the class while including questions and answers in one's mind when problem solving. For instance, "I know that I need to get this variable by itself, but there's a coefficient in the way. How can it get it out of there? Maybe I can subtract it? But it doesn't make sense to subtract a number from a monomial. But then I know that the coefficient is attached to the variable by multiplication . . . so maybe I can get rid of it with division! Yeah, let's try that!" This strategy can provide confidence to the learner who is preparing for a high-stakes exam that not all attempts lead to the "correct" answer and that all problem solvers may make missteps when attacking a problem.

Applications of KWC and "Think Alouds" to Test Preparation

In their final papers, Beth, Claire, and Dana discussed use of the KWC strategy for preparation for the state assessment test, referred to as the OAT. Beth wrote, "We completed various problems as we modeled the chart and how to use it. I did this for several days, until I felt they were comfortable using the chart. I then broke the students into small groups and gave them a sample (state assessment) problem. They were instructed to find the answer using the chart to help them. They had no trouble using the chart and actually liked the way it helped them to eliminate information that was not needed in order to solve the problem. We had a good discussion on when to use this chart or when not to. I gave the students example OAT test math questions; they were to work in groups to explain why various questions were good to use with this strategy." Dana wrote that she used the technique to help students practice short answer and extended response items for the state assessment exam.

Claire wrote, "I also used the KWC chart as an OAT prep strategy. In preparing my KWC charts, I realized the 'Think Aloud' lends (itself) well to the KWC chart. This graphic organizer helps students to think about what they are reading in a story problem, and guides their thinking. ... I feel that those students who struggled with the first way I taught them at the beginning of the school year will use the KWC chart on the OAT to help solve story problems."

Dana wrote, "I think by using the KWC chart the students increased their awareness of how to answer a two point and four point extended response question in a different way. I believe it helped them open up and share their ideas. My lower students were able to answer one of the three questions if not all, and they were NOT embarrassed."

Eve stated in her final paper that the KWC strategy alone made the whole project worthwhile and that her students were now using this graphic organizer on a daily basis without being reminded.

Claire discussed the usefulness of Think Alouds for test preparation: "I used both of these reading strategies ("Think Aloud" and KWC chart) in my classroom as strategies to help prep students for the OAT. I feel that the "Think Aloud" strategy was most effective! I first used this strategy by modeling to students my thinking when I encounter a story problem. I used the online program Study Island as the means

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of creating the story problems. Study Island is a great tool for implementing this strategy because each student is not only working on different questions, but they are also working on different mathematical topics. After a few days of me modeling to students my Think Alouds, I next asked students to think aloud for me when reading a story problem. Not only did this strategy help students to think about what they are reading, but I also used this strategy to help students eliminate answers when trying to solve multiple- choice questions. Again I modeled for students how to think about the different choices and how their thinking can help eliminate an unreasonable choice. I feel that this "Think Aloud" strategy will help students when taking the OAT."

The teachers began discovering how both techniques worked well when merged together and strengthened their test preparation strategies. Claire posted, "In reflecting upon my teaching in the past few months, I realized that I use the Think Aloud strategy often; however, with the OAT just a few weeks away, I am using the 'Think Aloud' strategy a lot more than usual with my math classes."

Allie added, "That's a great idea now with the OAT's and thinking aloud how to ELIMINATE answers. I think sometimes we stress that they need to think through every answer and if it is correct. Won't it be shorter time on the overall question if they do their "guesstimation" and then eliminate? This thinking aloud works more because they think you know the answer immediately anyhow."

Claire responded, "Any way to get my students a few extra minutes on the test! I sometimes feel that they work so hard, and have to rush through the last 10 questions or so, because they have spent too much time on checking all the different answer (on multiple choice questions) at the beginning of the test."

Beth commented on her use of the KWC strategy to move her students away from non-strategic test strategies: "I did a whole power point on how to eliminate answers for the OAT. I have been trying to erase the notion that a 4th grade teacher taught them...just choose C if you don't know the answer. I am just pulling my hair out. I am using this chart to get me out of this bind. This has been a great strategy."

Eve noted, "I have also been using the "Think Aloud" for the OAT prep. I have been using the "Think Aloud" in so many subjects that students are even feeling comfortable sharing their thinking. That has been one of the greatest things. We all know that they tune us out after a certain point. ... I love the KWC chart. It lends itself so well to practicing for the OAT questions especially the dreaded extended response questions."

Conclusions

The teachers in this project discovered that the KWC and "Think Aloud" literacy strategies are effective test preparation strategies. In particular, these tools can be effective for helping students prepare and respond to short and extended answer responses on high-stakes assessments. The "Think Aloud" strategy can also be effective for helping students reason through multiple choice items, helping them eliminate obviously incorrect choices. Mathematics teachers are always looking for new and unique strategies to use with students when it comes to high-stakes preparation. Literacy teaching strategies, such as KWC and "Think Aloud," prove to be a source of new teaching strategies for math teachers.

References

Firestone, W. A., et al. (2002). The Ambiguity of Test Preparation: A Multimethod Analysis in One State,

Teachers College Record, 104 (7), 1485-1523.

Fogelberg, E., Skalinder, C., Satz, P., Hiller, B., & Bernstein, L. (2008). I*ntegrating Literacy and Math: Strategies for K-6 Teachers.* New York, NY: The Guilford Press.

Kenney, J. M., et al. (2005). *Literacy Strategies for Improving Mathematics Instruction.* Alexandria, VA: ASCD Books

Hong, E., Sas, M, & Sas, J. C. (2006). Test-Taking Strategies of High and Low Mathematics Achievers, *The Journal of Educational Research, 99* (3), 144-155.

Hyde, A. (2005). *Comprehending Math Adapting Literacy Strategies to Teach Mathematics, K-6.* Portsmouth, NH: Heinemann.

Litton, N., & Wicket, M. (2009). *This Is Only a Test: Teaching for Mathematical Understanding in an Age of Standardized Testing.* Sausalito, CA: Math Solutions.

Rex, L. A., & Nelson, M. C. (2004). How Teachers' Professional Identities Position High-Stakes Test Preparation in Their Classrooms, *Teachers College Record, 106* (6), 1288-1331.

Smith, M. L. (1991). Meanings of Test Preparation, *American Educational Research Journal, 28* (3), 521- 542.

Turner, S. L. (2009). Ethical and Appropriate High-Stakes Test Preparation in Middle School: Five Methods that Matter, *Middle School Journal, 41* (1), 36-45.

Volante, L. (2004). Teaching to the Test: What Every Educator and Policy Maker Should Know. *Canadian Journal of Educational Administration and Policy Issue 35.*

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